

General

Guideline Title

Guidelines for diagnosing and managing pediatric concussion.

Bibliographic Source(s)

Ontario Neurotrauma Foundation. Guidelines for diagnosing and managing pediatric concussion. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 129 p.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): See the original guideline document for information about when, by whom, how, and why each of the following recommendations should be performed.

Definitions for the levels of evidence (A-C) are provided at the end of the "Major Recommendations" field.

Recommendations by Timeline

In Advance (before the first activity)

- Learn to recognize the symptoms of concussion. (Level of evidence: B)
- Adopt a formal policy that prevents a child/adolescent who may have sustained a concussion from returning to play on the same day as the injury. (Level of evidence: B)
- Ensure policies are in place to accommodate a child/adolescent who has sustained a concussion. (Level of evidence: B)
- Consider baseline neuro-cognitive testing if the child/adolescent plays high-risk sports—not as a general rule. (Level of evidence: B)

On Injury (if I suspect concussion)

- Remove the child/adolescent from play immediately if you suspect a concussion. (Level of evidence: B [ages 13+])
- Assess the child/adolescent for symptoms related to concussion. (Level of evidence: B [ages 13+])
- Watch for possible symptoms of concussion to evolve. (Level of evidence: B)
- Take a child/adolescent who shows symptoms of concussion to a health care professional. (Level of evidence: B)

On Presentation (what are the "red flags"?)

- Assess and treat any physical, cognitive and neurological deficits. (Level of evidence: A for assess [ages 13+]; B for treat)
- Determine the need for computed tomographic (CT) imaging. (Level of evidence: A)
- Consider admission or prolonged observation if the child/adolescent shows "red flag" symptoms. (Level of evidence: B)
- Treat acute headaches. (Level of evidence: C)
- Prescribe physical and cognitive rest. (Level of evidence: B for need for rest; C for ideal duration of rest)
- Discharge the child/adolescent for observation at home under certain conditions. (Level of evidence: B)

On Discharge ("What do we tell parents and/or caregivers?" and "What do we do at home?")

- Provide verbal information and written handouts to the child/adolescent and the parents and/or caregivers. (Level of evidence: A for intensive educational program; B for written instructions)
 - Inform on the expected course of recovery and return-to-learn/play. (Level of evidence: B)
 - Advise on the risks and complications of re-injury, especially of persistent symptoms. (Level of evidence: B)
 - Advise on managing sleep proactively. (Level of evidence: C)
 - Advise on managing headaches. (Level of evidence: B)
 - Advise on coping with fatigue. (Level of evidence: B)
 - Advise on maintaining social networks and interactions. (Level of evidence: B)
 - Advise on avoiding alcohol and other recreational drugs. (Level of evidence: B)
 - Advise on avoiding driving during recovery. (Level of evidence: B)
 - Advise on general monitoring, regular follow up with primary care or a sport medicine physician until symptoms disappear, and referral to specialized care after one month if symptoms persist. (Level of evidence: B for need for rest; C for ideal duration of rest)
 - Follow the written and verbal information your health care professional gives you. (Level of evidence: B for need for rest; C for ideal duration of rest)

On Interim Assessment (when can the child/adolescent return to learn/play?) and On Return to School (what do we monitor in the longer term?)

- Recommend that the child/adolescent follow a stepwise return-to-learn plan. (Level of evidence: B for need for rest; C for ideal duration of rest)
- Develop a return-to-learn program after acute symptoms have improved. (Level of evidence: B for need for rest; C for ideal duration of rest)
- Recommend additional assessment and accommodations if symptoms worsen or fail to improve. (Level of evidence: B for need for rest; C for ideal duration of rest)
- Develop a return-to-play program only after the child/adolescent has started his/her return-to-learn program. (Level of evidence: B for need for rest; C for ideal duration of rest)
- Refer any child/adolescent who has sustained multiple concussions to an expert in sport concussion to help with return-to-play decisions and/or retirement from contact sports. (Level of evidence: B)

On Re-Assessment After One Month (what do we do next if the child/adolescent still has symptoms?)

- Assess any modifiers that may delay recovery. (Level of evidence: B)
- Make sure the child/adolescent is not taking any medication that might mask or modify the symptoms. (Level of evidence: B)
- Assess, document and manage significant, prolonged complaints based on specific symptoms, etiology and the time since injury. (Level of evidence: B)
- Place every child/adolescent on a program of sleep hygiene. (Level of evidence: C)
- Screen for factors that may influence the child/adolescent's sleep/wake cycle. (Level of evidence: B)
- Consider non-pharmacological treatments to improve sleep. (Level of evidence: C)
- Consider prescribing medication on a short-term basis if sleep has not improved. (Level of evidence: C)
- Refer the child/adolescent to a pediatric sleep specialist if sleep has not improved. (Level of evidence: C)
- Take a history of any headaches. (Level of evidence: B)
- Establish the degree and duration of the disability that the headaches cause. (Level of evidence: B)
- Perform a neurological exam and a head/neck exam. (Level of evidence: C)
- Consider non-pharmacological, complementary and/or alternative medicine therapies for headache. (Level of evidence: C)
- Consider treating migraine headaches with prescription medication. (Level of evidence: B)
- Assess for persistent cognitive difficulties. (Level of evidence: B)

- Manage any cognitive impairments. (Level of evidence: B)
- Assess for balance and vestibular impairments. (Level of evidence: B [for ages 13+])
- Assess for benign positional vertigo. (Level of evidence: B)
- Refer for further assessment and treatment if balance and/or vestibular system are dysfunctional. (Level of evidence: B)
- Assess ongoing vision dysfunctions. (Level of evidence: B)
- Refer children/adolescents who have changes in functional vision to a specialist. (Level of evidence: B)
- Assess and manage persistent fatigue if it is a significant symptom. (Level of evidence: B)
- Assess for existing and new mental health symptoms and disorders. (Level of evidence: B)
- Ask the child/adolescent and parents and/or caregivers to report on mood and feelings. (Level of evidence: B)
- Treat any mental health symptoms. (Level of evidence: B)
- Consider referring to a specialist with experience in pediatric mental health. (Level of evidence: B)
- Recommend rehabilitation therapy to improve symptoms and mobility, as needed. (Level of evidence: B)
- Consider a broad differential diagnosis. (Level of evidence: C)
- Consider the need for specialized therapy if symptoms persist. (Level of evidence: B)
- Work with the child/adolescent's primary care professional, school and/or employer regarding accommodations needed to tasks or schedules. (Level of evidence: B)
- Assess and treat any physical, cognitive and neurological deficits. (Level of evidence: B for treat)

Definitions:

Levels of Evidence

There are many ways to grade levels of evidence. Some emphasize the quality of randomized clinical trials. However, because so few randomized clinical trials have studied pediatric concussion, a broader system was used to rank evidence that also emphasizes the strength of systematic reviews or large studies that may not involve interventions. In this system, A is the strongest level of evidence. The levels are defined as follows:

- A = Consistent, good-quality, patient-oriented evidence (example, at least one large randomized control trial, meta-analysis or systematic review with homogeneity, or large, high-quality, multi-centre cohort study)
- B = Inconsistent or limited-quality patient-oriented evidence (example: smaller cohort studies, case studies or control trials with limitations)
- C = Consensus, usual practice, opinion or weaker-level evidence

Clinical Algorithm(s)

The following algorithms are provided in the original guideline document:

- Tool 2.1: Management of Acute Symptoms Algorithm
- Tool 2.5: PECARN Management Algorithm for Children After Head Trauma
- Tool 2.6: Management of Persistent Symptoms Algorithm
- Tool 2.9: Algorithm for the Management of the Pediatric Patient \geq 2 Years with Minor Head Trauma
- Tool 5.1: Management of Persistent Headache in Children Algorithm
- Tool 5.7: Management of Persistent Mental Health Disorders Algorithm

Scope

Disease/Condition(s)

Concussion

Note: These guidelines do not apply to children/adolescents who have moderate-to-severe closed head injuries, moderate-to-severe developmental delays, neurological disorders, penetrating brain injuries or brain damage from other causes, such as injuries at birth or in infancy.

Guideline Category

Diagnosis

Management

Clinical Specialty

Emergency Medicine

Family Practice

Pediatrics

Physical Medicine and Rehabilitation

Sports Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Emergency Medical Technicians/Paramedics

Health Care Providers

Hospitals

Nurses

Occupational Therapists

Patients

Physical Therapists

Physician Assistants

Physicians

Psychologists/Non-physician Behavioral Health Clinicians

Guideline Objective(s)

To develop high quality, evidence-based recommendations that:

- Standardize the diagnosis and management of pediatric concussion
- Are relevant and useful for health care professionals
- Improve the care of children/adolescents who have sustained a concussion
- Reduce the impact of concussion on the mental health, social engagement and academic participation of children/adolescents during their formative years
- Identify knowledge gaps in the literature that require more research

Target Population

Every child/adolescent aged 5 to 18 years who has or may have sustained a concussion in the previous month

Note: These guidelines do not apply to children under 5 years. Diagnosing concussion in children under five years is controversial because it relies heavily on the child's ability to recognize and/or communicate his/her symptoms. Most preschoolers have not developed that capacity yet. As well, there are no validated tools for this age group.

Interventions and Practices Considered

1. In advance
 - Learning to recognize symptoms
 - Creation and enforcement of policies regarding children with concussion
 - Baseline neurocognitive testing
2. On injury
 - Removal of the child from activities
 - Assessment of and observation for symptoms
 - Visiting a health care professional
3. On presentation
 - Assessment and treatment of symptoms, including computed tomographic (CT) imaging if appropriate
 - Admission or prolonged observation
 - Physical and cognitive rest
 - Discharge for observation at home
4. On discharge: verbal information and written handouts for the patient and parents/family
5. On interim assessment
 - Development and recommendation of a return-to-learn plan
 - Additional assessment if symptoms do not improve
 - Development of return-to-play program
 - Referral to a specialist
6. On reassessment after one month
 - Assessment of modifiers that may delay recovery, including medications
 - Documentation and management of significant, prolonged complaints, including sleep disorders, headaches, cognitive impairments, balance and vestibular impairments, persistent fatigue, and mental health symptoms
 - Rehabilitation therapy
 - Consideration of broader differential diagnosis and specialized therapy
 - Working with other professionals to ensure accommodation

Major Outcomes Considered

- Sustained multiple concussions
- Post-traumatic headache
- Persistent symptoms

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search and Synthesis of Information

The panel agreed to use the definition of concussion provided in the 4th Zurich Consensus Statement.

A comprehensive literature search was done to identify research and guidelines that might be relevant, such as:

- Diagnostic challenges unique to pediatrics, including the decision to obtain neuroimaging in the acute care setting
- Potential modifiers for persistent symptoms
- Management of concussion in children/adolescents as it differs from that in adults

- Return-to-school/play recommendations and rehabilitation interventions for the children/adolescents
- Impact of mental health
- Social engagement and academic and participation challenges for children/adolescents

Inclusion criteria were concussion/mild traumatic brain injury (mTBI), systematic reviews, guidelines or primary research on concussion/mTBI. Exclusion criteria were adult-only populations, conference abstracts and papers either not peer-reviewed or that focused on prevention, and patients in whom the computer tomography (CT) or magnetic resonance imaging (MRI) showed structural changes or bleeding.

The panel collaborated with the co-chairs from the 2013 update of the "Guidelines for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)" to identify articles that addressed the pediatric population to help streamline efforts and reduce duplication.

A PhD librarian/information specialist generated the search string, and had it reviewed using Peer Review of Electronic Search Strategies (PRESS). See Appendix 1: Search Strategy for Systematic Review in the complementary *References and Levels of Evidence* document (see the "Availability of Companion Documents" field). The search string did not impose any limits on language or study design. Once accepted, it was used to search the following databases: MEDLINE, EMBASE, PsycINFO, CENTRAL, CINAHL, SPORTDiscus and TRIPDatabase. The literature search resulted in over 3,000 unique articles and 13 domains of interest (see table in the original guideline document).

Two reviewers independently screened each identified citation as "definitely," "possibly," or "clearly not" meeting inclusion criteria using a standard screening tool. A research assistant/medical student performed duplicate review on a sample of 132 abstracts to evaluate the inter-rater agreement of the article's eligibility. In the event of disagreement or uncertainty, the project leader consulted the full text and resolved differences. Following this exercise, the inclusion criteria were modified to exclude books and dissertations, which pared the list of articles down to about 400. After a further review of the full text of each, the list was narrowed to 242 articles.

Number of Source Documents

A total of 5742 citations were initially identified. After duplicates were removed and a post-calibration modification was performed to remove books and dissertations, 3054 citations remained. A title and abstract review resulted in an in-depth full-text review of 422 citations. An expert review was conducted on 242 remaining articles.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence

There are many ways to grade levels of evidence. Some emphasize the quality of randomized clinical trials. However, because so few randomized clinical trials have studied pediatric concussion, a broader system was used to rank evidence that emphasizes the strength of systematic reviews or large studies that may not involve interventions. In this system, A is the strongest level of evidence. The levels are defined as follows:

- A = Consistent, good-quality, patient-oriented evidence (example, at least one large randomized control trial, meta-analysis or systematic review with homogeneity, or large, high-quality, multi-centre cohort study)
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- C = Consensus, usual practice, opinion or weaker-level evidence

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

The articles were sorted into 15 domains (two were added to the original 13) using Mendeley reference manager, version 1.11. Articles were assigned to panel members with expertise in those domains to assess the quality of the studies and their strength/limitations, determine their applicability to pediatric concussion and assign a level of evidence (General Directions for Clinical Use) to potentially relevant papers. The papers were made available through a web-based data-sharing tool (Alfresco) to improve the efficiency of collaboration and to manage and store documents in a secure place.

Methods Used to Formulate the Recommendations

Expert Consensus (Consensus Development Conference)

Description of Methods Used to Formulate the Recommendations

Guideline Panel

The project leader engaged a team of experts from Canada and the USA to represent the full spectrum of pediatric health disciplines and expertise in concussion on a national and international scale. As well, to ensure that the document represents the perspectives of as many groups of stakeholders as possible, the panel included the chair of the 2012 Zurich Concussion in Sport Conference, the co-founder and director of the Brain Injury Centre (Harvard University), the chair of the American Academy of Neurology Concussion Guidelines, the developer of commonly used post-concussion tools (example: Acute Concussion Evaluation [ACE], Post-Concussion Symptom Inventory [PCSI]), community- and school-based experts and organizational stakeholders, and the funder, the Ontario Neurotrauma Foundation (ONF). The choice of members reflected the focus on clinical assessment and management rather than prevention.

Guideline Model

The project leader used the Practice Guidelines Evaluation and Adaptation Cycle (see diagram in the original guideline document) as the model for developing the guidelines. The need and rationale for guidelines on pediatric concussion had already been established.

Glaser Method of Reaching Consensus

Like the Delphi and nominal group approach, Dr. Edward Glaser and the National Institutes of Health developed a method of reaching consensus in which various levels of participation interact with the main level (a core group that includes the project leader and that chooses its own members internally). The project document is revised internally until considered suitable, and critiqued by health care professionals who have been engaged for their expertise and prominence. Those comments are included in a redraft until the core group is satisfied with the result.

Among the characteristics of the Glaser method are the degree of support behind the project following a statement by experts of a demonstrated need, the number of organizations and people invited to comment at every stage, and the involvement of a leader who would be called a "knowledge broker" in today's language.

The project team chose the Glaser method of reaching consensus as the most suitable for its situation, given the attributed voting and commenting tools and the group-based discussions at the consensus meeting (see below). Where there was uncertainty at any stage, the project leader sent the text in question to the designated experts for further review.

Consensus Meeting

The project team, including stakeholders, attended the consensus meeting held on November 19, 2013 in Ottawa, Ontario. Participants worked in groups according to their expertise to draft the initial recommendations based on existing guidelines and generate new ones based on their review of the papers, the level of evidence assigned or their clinical expertise if they found no evidence (General Directions for Clinical Use). This was done using the ADAPTE process (a systematic approach for the adaptation of guidelines that was used to develop and update the "Guidelines for Concussion/ Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)."

Recommendations

Since most concussions resolve within one month, the panel decided that a document based on timelines would be more helpful for clinicians (the primary users of the guidelines) than one based on themes. The initial recommendations in the 15 domains were reorganized as follows:

In advance and On injury address issues such as adopting policies on concussion and recognizing symptoms in schools and/or sports organizations, and were designed primarily for schools and parents and/or caregivers. On presentation covers acute care, such as initial diagnosis and

management. On discharge focuses on the verbal and written information needed to reassure and educate parents and/or caregivers on the course of recovery. On interim assessment evaluates child/adolescent's early recovery, and introduces return-to-learn/play processes. Finally, On re-assessment reinforces cognitive and physical rest, if required, and provides guidance on managing persistent symptoms.

The initial recommendations were also converted from statements into bulleted action items, incorporating the tools recommended for use and a short sentence to explain the necessity of the action immediately below. The project team felt that clinicians, schools and/or community sports organizations/centres, and parents and/or caregivers alike would find this format easy to follow. This design is also suitable for converting the recommendations into an interactive web tool or mobile app, should funding materialize. The recommendations were created using the Appraisal of Guidelines for REsearch & Evaluation Instrument (AGREE II) tool as a foundation for content.

Panel members took into consideration the potential benefits, side effects and risks when drafting the recommendations. Particularly unique to pediatrics, for example, is the limited approval of drugs such as non-steroidal anti-inflammatory drugs (NSAIDs) for pediatric use by regulatory organizations such as Health Canada and the U.S. Food and Drug Administration, as demonstrated in Tool 5.6: Approved Medications for Pediatric Indications (see the original guideline document).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Following the consensus conference, the tools, recommendations and guidelines document were refined repeatedly until consensus through an on-line feedback and voting process (REDCap). A final PDF was circulated among external reviewers (who were not involved in the development process) and finalized based on their feedback.

External Review

External reviewers (see "Project Team" in the original guideline document for their qualifications and affiliations) were chosen for their expertise in relevant areas of pediatrics, their role as stakeholders in improving care and management of pediatric concussion, and their dispersed geographical locations.

None of the external reviewers was involved in developing these guidelines or in updating the "Guidelines for Concussion/Mild Traumatic Brain Injury and Persistent Symptoms Second Edition For Adults (18+ years of age)," which the Ontario Neurotrauma Foundation (ONF) also funded.

The reviewers' role was to assess the quality of the document and provide feedback with which to finalize its content. Each reviewer received an electronic copy of:

- The draft guidelines document
- The Appraisal of Guidelines for REsearch & Evaluation Instrument (AGREE II) to use its rating scale for scoring
- Review sheets on which to record their scores in response to AGREE II categories and add comments

The reviewers rated the guidelines document in the following categories:

- Scope and purpose 94%
- Stakeholder involvement 89%
- Rigour of development 91%

- Clarity of presentation 90%
- Applicability 94%
- Editorial independence 95%

The reviewers also rated the overall guidelines document 90 percent for quality. After their specific comments to improve the guidelines were addressed, all three reviewers said they would recommend the document for use as-is.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is not specifically stated.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate diagnosis and management of pediatric concussion

Panel members took into consideration the potential benefits, side effects and risks when drafting the recommendations.

Potential Harms

See Tool 5.12 in the original guideline document for considerations regarding pharmacotherapy. Use clinical judgment and discretion at all times when prescribing medication.

Contraindications

Contraindications

Avoid using benzodiazepines as first-line therapy for anxiety.

Qualifying Statements

Qualifying Statements

- The strength of the current body of evidence is the exponential growth of articles published on pediatric concussion since 2000. Notably, the literature has clarified the need for pediatric computed tomographic (CT) imaging in the emergency setting through several well designed prospective multi-centre studies, the results of which will reduce the incidence of unnecessary radiation in children/adolescents.
- However, the body of evidence has several limitations. The field of pediatric concussion is still in its infancy compared to that of general traumatic brain injury (moderate and severe). As stated above, very few randomized clinical trials have examined the results of possible therapies, both pharmacological and non-pharmacological. In particular, the ideal duration of physical and cognitive rest remains unknown.
- As well, very few studies have examined pediatric concussion beyond the context of sports injury or examined the long-term outcomes of children/adolescents who have sustained multiple concussions and the possible link to severe cognitive outcomes. Lastly, these guidelines relate to children aged 5 to 18 only. The guideline panel was unable to include recommendations for preschoolers (aged 0 to 5) due to a lack of literature and validated assessment tools for that age group.
- This document is intended to guide health care professionals in diagnosing and managing pediatric—not adult—concussion. It is not for self-

diagnosis or treatment. Parents and/or caregivers may bring it to the attention of their child/adolescent's health care professionals.

- The best knowledge available at the time of publication has informed the recommendations in this document. However, health care professionals should also use their own judgment, the preferences of their patients, and factors such as the availability of resources in their decisions.
- The Ontario Neurotrauma Foundation (ONF), the project team and any developers, contributors and supporting partners shall not be liable for any damages, claims, liabilities, costs or obligations arising from the use or misuse of these guidelines, including loss or damage arising from any claims made by a third party.
- Also, as the sponsor of this document, the ONF assumes no responsibility or liability whatsoever for changes made to the guidelines without its consent. Any changes must be accompanied by the statement: "Adapted from *Guidelines for Diagnosing and Managing Pediatric Concussion* with/without permission," according to whether or not permission was sought and/or given.

Implementation of the Guideline

Description of Implementation Strategy

Integrated knowledge translation (KT) employing pre-established collaborations with end-knowledge users (Ontario Neurotrauma Foundation [ONF], Ontario Brain Injury Association, ThinkFirst, Hockey Canada, Canadian Medical Association, Canadian Pediatric Society, Translating Emergency Knowledge in Kids [TREKK], Institut national d'excellence en santé et service sociaux du Québec and Canadian Association of Emergency Physicians) will result in broad dissemination to health care providers and the public alike on pediatric concussion. The guideline panel will further employ the assistance of ONF and the Concussion/Mild Traumatic Brain Injury (mTBI) strategy group to facilitate the KT process and implementation to ensure the broadest dissemination and uptake.

Implementation Tools

Chart Documentation/Checklists/Forms

Clinical Algorithm

Patient Resources

Pocket Guide/Reference Cards

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Ontario Neurotrauma Foundation. Guidelines for diagnosing and managing pediatric concussion. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 129 p.

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2014 Jun

Guideline Developer(s)

Ontario Neurotrauma Foundation - Nonprofit Organization

Source(s) of Funding

Ontario Neurotrauma Foundation

Guideline Committee

Ontario Neurotrauma Foundation (ONF) Guideline Panel

Composition of Group That Authored the Guideline

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Funder: Corinne Kagan, BA (Hons), BPS Cert., Senior Program Director, ABI, Ontario Neurotrauma Foundation (ONF), Toronto, ON

Financial Disclosures/Conflicts of Interest

Editorial Independence

The project leader maintained full authority over the editorial content of these guidelines, under advice from members of the project team. Editorial decisions were made in teams of members with diverse backgrounds and expertise, and based on the relevance of the works reviewed to the subject matter, not on the views or interests of the Ontario Neurotrauma Foundation (the funder).

Because of her specific knowledge of knowledge transfer and concussion, and to represent the Foundation as an end-user of the guidelines, one employee of the Foundation had a monitoring role on the project team and moderated a discussion on KT in that context. She was not in a position to influence decisions.

Competing Interests

Members of the guideline panel and the external reviewers were asked for details about potential conflicts of interest. They made the following statements:

- Gerard Gioia: I am the author of several clinical measures, such as the Postconcussion Symptom Inventory (PCSI), Acute Concussion Evaluation (ACE), for which I do not receive monetary benefit. I am also a creator/author on measures for which I do receive royalty payments, including the Behavior Rating Inventory of Executive Function (BRIEF) and the Tasks of Executive Control (TEC).
- Chris Giza: I receive the following funding: NCAA Concussion Task Force (travel expenses) and research grant; California State Athletic Commission (travel expenses only); Joseph Drown Foundation (research grant), NIH (research grants). Relatives have no conflicts.
- Corinne Kagan: I represent the sponsor of the Guideline (Ontario Neurotrauma Foundation). I will make every effort not to interfere with the editorial independence of the guideline developers. As a member of the consensus group, I will add comments only as pertain to implementation and clarity, knowledge translation and use, system of care and policy issues of the materials.
- Anna McCormick: I occasionally bill privately to complete forms or reports for insurance purposes.
- William Meehan: I receive funding from the NFL Players' Association and royalties from Prager Publishing for the book, Kids, Sports, and Concussion: A guide for coaches and parents; and Wolters Kluwer for working as an author on UpToDate.

The project leader evaluated the statements and decided that these people did not face a conflict of interest in terms of creating or reviewing this document.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the [Ontario Neurotrauma Foundation \(ONF\) Web site](#) .

Availability of Companion Documents

The following are available:

- Guidelines for diagnosing and managing pediatric concussion. References and levels of evidence. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 30 p. Electronic copies: Available from the [Ontario Neurotrauma Foundation \(ONF\) Web site](#) .
- Guidelines for diagnosing and managing pediatric concussion. Recommendations for health care professionals. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 93 p. Electronic copies: Available from the [ONF Web site](#) .
- Guidelines for diagnosing and managing pediatric concussion. Recommendations for schools and/or community sports organizations/centres. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 48 p. Electronic copies: Available from the [ONF Web site](#) .

In addition, the tools in the [original guideline document](#) contain various resources, including assessment tools; a pocket recognition tool; information on return to play, activity, or school; evaluation forms and checklists; and other resources for medications and diagnostic criteria for headaches.

Patient Resources

The following is available:

- Guidelines for diagnosing and managing pediatric concussion. Recommendations for parents and/or caregivers. Toronto (ON): Ontario Neurotrauma Foundation; 2014 Jun. 21 p. Electronic copies: Available from the [ONF Web site](#) .

See the tools in the [original guideline document](#) for the Parachute Concussion Guidelines for Parents and Caregivers and After a Concussion Guidelines for Return to Play.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This NGC summary was completed by ECRI Institute on March 17, 2015. The information was verified by the guideline developer on March 27, 2015.

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